

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (Currently amended) A cigarette manufacturing apparatus comprising:
a tobacco rod maker for making double length tobacco rods;
a tipper for applying filters to tobacco rods to form filter tipped cigarettes;
a transfer apparatus for transferring double length tobacco rods from the rod maker to the tipper;

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wherein each of the tipper and the rod maker comprises a plurality of devices for monitoring and a plurality of devices for affecting parameters of the rod maker, the tipper and/or the cigarettes being manufactured, said plurality of devices being selected from the group consisting of blocks of sensors, pneumatic valves, variable speed drives for a picker/winnower, large and small fans and tobacco return, glue area sensors, pneumatic valve clutches, pneumatic auto cleaning valves and other devices not used in the motion control of the tipper and the rod maker, each of said devices comprising an embedded processor or interface that codes information for transmission and decodes messages the device receives, and wherein one or more of said monitoring devices and said parameter affecting devices both monitors and affects parameters;

a controller for controlling the plurality of devices on the tipper and the rod maker, including varying one or more parameters of the rod maker, the tipper and/or the cigarettes being manufactured, in response to conditions monitored by one or more of said devices; and

a field bus, the plurality of devices and the controller each being connected to the field bus.

2. (Original) Apparatus according to claim 1, further comprising a plurality of synchronous motors controlled by a motion controller.

3. (Original) Apparatus according to claim 2, wherein the motion controller is connected to the controller.

4. (Previously Presented) Apparatus according to claim 2, wherein the motion controller is connected to the field bus.

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5. (Previously Presented) Apparatus according to claim 2, wherein the plurality of motors includes a cut-off motor for driving a device for cutting individual tobacco rods, a suction chamber motor for driving a suction belt, a garniture belt drive motor, and a hopper motor for controlling the rate at which tobacco is drawn from a hopper.

6. (Original) Apparatus according to claim 5, wherein the rotational speed of the suction chamber motor, the garniture belt drive motor and the hopper motor are synchronised to the rotational speed of the cut-off motor.

7. (Canceled)

8. (Previously Presented) Apparatus according to claim 5, wherein the plurality of motors further includes an ecreteur motor for driving a dense end cam and a pair of ecreteur discs, a bobbin changer capstan motor, and a printer motor for driving a printer to print onto the cigarette wrapping paper.

9. (Previously Presented) Apparatus according to claim 8, wherein the ecreteur motor and the printer motor are speed and position synchronised to the cut-off motor.

10. (Previously Presented) Apparatus according to claim 5, wherein the plurality of motors further includes a tipper motor for driving a tipper drum train, wherein the tipper motor is synchronised to the position of the cut-off motor.

11. (Previously Presented) Apparatus according to claim 1, further comprising at least one human-machine interface (HMI) connected to the field bus.

12. (Original) Apparatus according to claim 11, wherein the at least one HMI comprises a rod maker HMI and a tipper HMI, each of the rod maker HMI and the tipper HMI being connected to the controller via the field bus.

13. (Previously Presented) Apparatus according to claim 1, comprising at least one human-machine interface (HMI) connected to the controller.

14. (Original) Apparatus according to claim 13, wherein the at least one HMI comprises a rod maker HMI and a tipper HMI, each of the rod maker HMI and the tipper HMI being connected to the controller.

15. (Previously Presented) Apparatus according to claim 11, wherein the at least one HMI is connected to a communications network.

16. (Previously Presented) Apparatus according to claim 1, wherein at least one of the plurality of devices is connected to the field bus via an interface.

17. (Canceled)

18. (Previously Presented) Apparatus according to claim 1, wherein at least one of the plurality of devices transmits data including diagnostic data to the controller over the field bus.

19. (Currently amended) A cigarette manufacturing apparatus comprising:
a tobacco rod maker for making double length tobacco rods;
a tipper for applying filters to tobacco rods to form filter tipped cigarettes;
a transfer apparatus for transferring double length tobacco rods from the rod maker to the tipper;

wherein each of the tipper and the rod maker comprises a plurality of devices for monitoring and a plurality of devices for affecting parameters of the rod maker, the tipper and/or the cigarettes being manufactured, said plurality of devices being selected from the group consisting of blocks of sensors, pneumatic valves, variable speed drives for a picker/winnower, large and small fans and tobacco return, glue area sensors, pneumatic valve clutches, pneumatic auto cleaning valves and other devices not used in the motion control of the tipper and the rod maker, each of said devices comprising an embedded processor or interface that codes information for transmission and decodes messages the device receives, and wherein one or more of said monitoring devices and said parameter affecting devices both monitors and affects parameters;

a first controller for controlling the plurality of devices on the tipper and the rod maker, including varying parameters of the rod maker, the tipper and/or the cigarettes being manufactured, in response to conditions monitored by one or more of said devices; and

a second controller for providing tipper, rod maker and cigarette information to an operator and for communicating input data from the user to one or both of the first and second controllers.

20. (Original) Apparatus according to claim 19, wherein the second controller includes at least one Human/Machine Interface (HMI) and communicates with the first controller, for communicating tipper, rod maker and cigarette data to an operator and for communicating input data to the first controller.

21. (Original) Apparatus according to claim 19, wherein the second controller comprises a tipper controller communicating with a tipper HMI and a rod maker controller communicating with a rod maker HMI.

22. (Previously Presented) Apparatus according to claim 21, wherein the tipper controller and the rod maker controller each comprises a PC.

23. (Previously Presented) Apparatus according to claim 21, wherein the tipper controller and the rod maker controller each comprises an HMI.

24. (Previously Presented) Apparatus according to claim 21, wherein the tipper controller and the rod maker controller are interconnected.

25. (Previously Presented) Apparatus according to claim 19, wherein the first controller and at least some of the rod maker and tipper devices are connected to a field bus.

26. (Original) Apparatus according to claim 25, wherein the second controller is connected to the field bus.

27. (Previously Presented) Apparatus according to claim 19, wherein the second controller is connected to an external communications network.

28. (Previously Presented) Apparatus according to claim 19, further comprising a motion controller controlled by the first controller for synchronising a plurality of motors on one or both of the rod maker and the tipper.

29. (Original) Apparatus according to claim 28, wherein the plurality of motors includes a cut-off motor for driving a device for cutting individual tobacco rods and the remainder of the plurality of motors is synchronised to the cut-off motor.

30. (Cancelled)

31. (Previously Presented) Apparatus according to claim 26, wherein the motion controller is connected to the field bus.

32. (Previously Presented) Apparatus according to claim 11, wherein the HMI is configured to display to the operator one of a hierarchical set of display screens.

33. (Previously Presented) Apparatus according to claim 32, wherein at least one of the set of screens includes areas representing buttons for controlling rod maker or tipper functions.

34. (Previously Presented) Apparatus according to claim 32, wherein the HMI is configured to display diagnostic information from tipper or rod maker components.

35. (Currently amended) A method of controlling the manufacture of cigarettes by an apparatus comprising a tobacco rod maker and tipper interconnected by a rod transfer apparatus, the method comprising the steps of:

providing a field bus and a machine controller connected to the field bus;
connecting a plurality of devices to the field bus for monitoring and a plurality of devices for affecting parameters of the rod maker, the tipper and/or the cigarettes being manufactured, said plurality of devices being selected from the group consisting of blocks of sensors, pneumatic valves, variable speed drives for a picker/winnower, large and small fans and tobacco return, glue area sensors, pneumatic valve clutches, pneumatic auto cleaning valves and other devices not used in the motion control of the tipper and the rod maker, each of said devices comprising an embedded processor or interface that codes information for transmission and decodes messages the device receives, one or more of said monitoring devices and said parameter affecting devices both monitoring and affecting parameters;

monitoring the field bus from the controller for data from the devices;
and automatically adjusting one or more parameters of the tipper or rod
maker in accordance with the information content of the data received.

36. (Original) A method according to claim 35, further comprising providing a
second controller to interface with the machine controller, wherein the machine controller
receives data from and sends data to the second controller.

37. (Previously Presented) A method according to claim 35, wherein the
machine controller looks for a signal on the field bus indicating a machine stop command
input from the second controller and, if the machine stop signal is present, sends a stop
signal to the devices.

38. (Previously Presented) A method according to claim 35, wherein the
machine controller looks for a signal on the field bus indicating an emergency stop
condition or indicating that a protective guard on the rod maker or tipper is not in place
and, if the signal is present, sends a stop signal to the devices.

39. (Previously Presented) A method according to claim 35, wherein the
machine controller looks for a signal on the field bus indicating a fault condition at one of
the devices and, if the fault condition signal is present, sends a stop signal to the device.

40. (Previously Presented) A method according to claim 35, wherein the
machine controller also communicates the stop signal to the second controller together with
information identifying the cause of the stop signal.

41. (Original) A method according to claim 40, wherein the information sent to
the second controller includes diagnostic information and component identification
information.

42. (Previously Presented) A method according to claim 35, wherein the machine controller looks for a signal on the field bus warning of a non-ideal condition at one of the devices and, if the warning signal is present, sends a warning signal to the second controller.

43. (Previously Presented) A method according to claim 35, wherein the devices include a cut-off motor which controls the cutting of cigarette rods from a continuous length of wrapped tobacco produced by the rod maker and a plurality of further motors synchronised to the cut-off motor.

44. (Cancelled)

45. (Previously Presented) A method according to claim 43, wherein the synchronised motors include motors synchronised by speed and motors synchronised by position.

46. (Previously Presented) A method according to claim 35, wherein the machine controller looks for a signal on the field bus indicating that a wrapping paper bobbin or a tipping paper bobbin is nearly exhausted and, if the signal is detected, initiates a routine to splice a fresh paper bobbin onto the present paper bobbin.

47. (Currently amended) A cigarette manufacturing apparatus comprising:
a tobacco rod maker for making double length tobacco rods;
a tipper for applying filters to tobacco rods to form filter tipped cigarettes;
a transfer apparatus for transferring double length tobacco rods from the rod maker to the tipper;
a plurality of synchronised motors each for driving a respective operation in the tipper or the rod maker;

wherein each of the tipper and the rod maker further includes a plurality of devices for monitoring and a plurality of devices for affecting parameters of the rod maker,

the tipper and/or the cigarettes being manufactured, said plurality of devices being selected from the group consisting of blocks of sensors, pneumatic valves, variable speed drives for a picker/winnower, large and small fans and tobacco return, glue area sensors, pneumatic valve clutches, pneumatic auto cleaning valves and other devices not used in the motion control of the tipper and the rod maker, each of said devices comprising an embedded processor or interface that codes information for transmission and decodes messages the device receives, and wherein one or more of said monitoring devices and said parameter affecting devices both monitors and affects parameters

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a motion control device for controlling the plurality of synchronised motors;
a system for controlling the plurality of devices on the tipper and the rod maker, including varying one or more parameters of the rod maker, the tipper and/or the cigarettes to be manufactured, in response to conditions monitored by one or more of said devices, the motion control devices being connected to the system controller; and
a field bus, the plurality of devices and the controller each being connected to a communications network.

48. (Currently amended) A cigarette manufacturing apparatus comprising:
a tobacco rod maker for making double length tobacco rods;
a tipper for applying filters to tobacco rods to form filter tipped cigarettes;
a transfer apparatus for transferring double length tobacco rods from the rod maker to the tipper;

wherein each of the tipper and the rod maker comprises a plurality of devices for monitoring and a plurality of devices for affecting parameters of the rod maker, the tipper and/or the cigarettes being manufactured, said plurality of devices being selected from the group consisting of blocks of sensors, pneumatic valves, variable speed drives for a picker/winnower, large and small fans and tobacco return, glue area sensors, pneumatic valve clutches, pneumatic auto cleaning valves and other devices not used in the motion control of the tipper and the rod maker, each of said devices comprising an embedded processor or interface that codes information for transmission and decodes messages the

device receives, and wherein one or more of said monitoring devices and said parameter affecting devices both monitors and affects parameters;

 a control network, the plurality of devices being coupled to the control network;

 a first controller connected to the control network for controlling the plurality of devices on the tipper and the rod maker, including varying one or more parameters of the rod maker, the tipper and/or the cigarettes to be manufactured, in response to the conditions monitored by one or more of said devices; and

 a second controller coupled to the first controller and including at least one HMI for providing tipper, rod maker and cigarette information to an operator and for communicating input data from the user to the first controller.

49. (Previously Presented) Apparatus according to claim 20, wherein the HMI is configured to display to the operator one of a hierarchical set of display screens.

50. (Previously Presented) Apparatus according to claim 49, wherein at least one of the set of screens includes areas representing buttons for controlling rod maker or tipper functions.
